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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/594,243	09/25/2006	Christian Walsdorff	296729US0PCT	2192

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EXAMINER	
NGUYEN, NGOC YEN M	

ART UNIT	PAPER NUMBER
1734	

NOTIFICATION DATE	DELIVERY MODE
09/29/2011	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No.	Applicant(s)	
	10/594,243	WALSDORFF ET AL.	
	Examiner	Art Unit	
	Ngoc-Yen Nguyen	1734	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on July 1 and 15, 2011.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on ____; the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

5)☒ Claim(s) 10 and 13-26 is/are pending in the application.

5a) Of the above claim(s) 18 is/are withdrawn from consideration.

6)☐ Claim(s) ____ is/are allowed.

7)☒ Claim(s) 10, 13-17, 19-26 is/are rejected.

8)☐ Claim(s) ____ is/are objected to.

9)☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

10)☐ The specification is objected to by the Examiner.

11)☐ The drawing(s) filed on ____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

12)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. ____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date ____.

4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: ____.

DETAILED ACTION

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 10, 13-17, 19-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hibi et al (2002/0172640) in view of Iaccino et al (2008/0047872) and Shirk (3,482,946).

Hibi ‘640 discloses a process of producing chlorine by oxidizing hydrogen chloride with oxygen using a supported ruthenium oxide catalyst (note claim 1). The support can be titanium oxide, alumina, zirconium oxide, etc. (note claim 4). This process is well known in the art as a Deacon process and the reaction is well known to be an exothermic reaction.

Hibi ‘640 further teaches that the catalyst can be used in a reactor such as fixed bed reactor, fluidized bed reactor, etc. with the fluidized bed has an advantage that the temperature distribution width in the reactor can be reduced because heat in the reactor can be sufficiently removed (note paragraph [0067]-[0068]).

The difference is Hibi ‘640 does not disclose that the temperature within the fluidized bed decreases from an absolute temperature maximum along the flow direction to the surface of the fluidized bed.

Iaccino '872 teaches that for an exothermic reaction, it may be carried in multiple catalyst beds with heat removal between beds. In addition, the lead bed(s) may be operated at higher temperatures to maximize kinetic rates and the tail bed(s) may be operated at lower temperatures to maximize thermodynamic conversion (note paragraph [0098]).

It would have been obvious to one of ordinary skill in the art to optimize the temperature difference between the lead bed and the tail bed to maximize both the kinetic rate and the thermodynamic conversion for the process of Hibi '640.

Shirk '946 is applied to teach a reactor for effecting contact between vaporous reactants and fluidized (note claim 1) finely divided solids in which an upright, elongate reaction zone is compartmented. Means are provided to introduce gasiform fluids into the lower end of the reactor and to remove gasiform fluid, free of solids, from the upper end of the reactor. Temperature control means is provided within each compartment to that the mixture of vapors and fluidized solids moving freely within and between compartments may have independent temperature adjustment within each compartment (note abstract). Shirk '946 further teaches that the reactor design provides an excellent means of maintaining the desired operating temperature within about 3°F, assuring the removal of the exothermic heat of reaction (note column 4, lines 47-51).

As shown in Figure 1 of Shirk '946, the bed can be divided into multiple zones. The bottom perforated tray as shown in Figure 1 is considered as the claimed "gas distributor". It would have been obvious to one of ordinary skill in the art to optimize the process conditions in Shirk '946, such as superficial gas velocity, the shape of the

opening for the perforated plate, etc. in order to obtain the desired temperature in the fluidized bed.

For the limitation “only one fluidized bed” as required in the instant claim 10, such limitation does not exclude the presence of multiple zones, formed by inserting dividing plates in one single fluidized bed, (note the instant claims 25-26) as long as a single gas stream is used as the fluidizing gas for all the zones in the fluidized bed. The apparatus as shown in Figure 1 of Shirk ‘946 is considered as "only one fluidized bed" since it only uses one gas stream to fluidize all the zones and it has “only one gas distributor” (i.e. the bottom perforated tray, the other perforated trays are considered as dividing plates”). Furthermore, Shirk ‘946 discloses that the holes in the perforated trays permit catalyst to continuously flow into and out of a given compartment from above and below (note column 2, lines 50-53), thus, all the compartments as disclosed in Shirk '946 is considered as one single fluidized bed.

For the combined teaching of the references, at the start of the process, the reactants would need to be heated to a temperature at which the reaction would occur and the reaction temperature would increase quickly because it is an exothermic reaction to reach the absolute temperature maximum (the desired or required reaction temperature). At this temperature maximum, as suggested by Iaccino ‘872, the kinetic rates can be maximized. However, in order to maximize the thermodynamic conversion, the temperature needs to be lowered, also as suggested by Iaccino '872. Since the decrease in temperature is carried over multiple catalyst beds (or zones), the distance between the absolute temperature maximum and the gas distributor (i.e., the

distance it takes to increase the temperature to the absolute maximum) would naturally be smaller than the distance between the absolute temperature maximum and the surface of the fluidized bed (i.e., the distance it takes to decrease the reaction temperature to maximize thermodynamic conversion). In any event, it would have been obvious to one of ordinary skill in the art to optimize the rate of heating (thereby the distance it takes to accomplish the heating) and the rate of cooling to lower the temperature (thereby the distance it takes to accomplish the cooling) in the combined teaching to maximize not only kinetic rates but also thermodynamic conversion for the exothermic process of produce chlorine. It would have been obvious to one of ordinary skill in the art at the time the invention was made to carry the exothermic reaction of producing chlorine as disclosed in Hibi ‘640 with higher temperature at the beginning of the reaction (i.e. lead bed) and lower temperature at the end (tail bed), as suggested by Iaccino ‘872 in order to maximize both the kinetic rate and the thermodynamic conversion and to use a single fluidized bed reactor as suggested by Shirk ‘946 because this reactor is compartmented and each compartment can serve as a "bed" as suggested in Iaccino '872 and the temperature in each compartment can be controlled independently to obtain the higher and lower temperatures as desired by Iaccino '872.

Claims 10-17, 19-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hibi ‘640 in view of Degnan et al (5,573,657) and Shirk ‘946.

Hibi ‘640 is applied as stated above.

Degnan ‘657 is applied to teach that for an exothermic process, it is thermodynamically favored by lower temperatures but for kinetic reasons, moderately elevated temperatures (i.e. higher temperatures) are normally used (note column 1, lines 32-35).

Thus, it would have been obvious to one of ordinary skill in the art to maximize both the kinetic rate and the thermodynamic conversion for the process of Hibi ‘640 by operating the fluidized bed at two different temperatures, i.e. at a higher temperature for kinetic reasons, and lower temperature for thermodynamic reasons, as suggested by Degnan ‘657.

Shirk ‘946 is applied as stated above to teach that a fluidized bed can have multiple compartments and the temperatures in these compartments can be independently controlled.

Applicant's arguments filed July 1 and 15, 2011 have been fully considered but they are not persuasive.

Applicants argue that if one skilled in the art would have combined Hibi et al with Iaccino et al and Shirk, that person would have modified the fluidized bed reactor of Shirk, which is divided into a series of compartments so that this reactor had a heat removal between the respective beds for maximizing the thermodynamic conversion as suggested by Iaccino et al while in the claimed invention, the reaction is performed in a fluidized bed reactor solely comprising a fluidized bed and a gas distributor, i.e. only one single compartment.

As stated in the above rejection, the claimed "only one fluidized bed" is considered as any fluidized bed that uses only one gas stream to fluidize one of more multiple zones in a bed, not as having one compartment as argued by Applicants. It should be noted that "only one fluidized bed" as required in Applicants' claim 10 does not exclude the presence of dividing plates (note claims 25-26 and the Supplement response filed July 15, 2011) and the dividing plate 7, as shown in Figure 2 is "configured so that the gas bubbles pass through openings in the dividing plate 7 into the second temperature zone 8" and "ensures that only a small proportion of granular material of the fluidized bed is entrained in the ascending gas" (note page 12, lines 8). Thus, the claimed "only one fluidized bed" can have multiple zones, which are separated by the dividing plates, just as multiple zones or compartments as disclosed in Shirk '946.

Applicants argue that since the temperature within the single compartment relatively quickly reaches the absolute temperature maximum, the gas stream needs a considerably longer time for the temperature to drop to a lower temperature until the surface of the fluidized bed, thus, the distance between the absolute temperature maximum and the gas distributor is smaller than the distance between the temperature maximum and the surface of the fluidized bed.

In the combined teaching of applied reference, since Iaccino '872 teaches that the first bed is operated at higher temperatures to maximize kinetic (note paragraph [0098]), the temperature of the exothermic reaction would also rapidly increase in the combined teaching. It should be noted that the fluidized bed as shown in Figure 1 of

Shirk does not have any temperature control unit at the bottom of the fluidized bed (note "auto-regeneration zone"). This allows the temperature of the reaction to quickly increase to the desired maximum temperature to obtain the maximum kinetic. Also, in the combined teaching, it would also be slower to lower the temperature at the top of the fluidized bed (tail zones) because heat must be removed from the exothermic reaction, thus, the distance between the "absolute temperature maximum" and the gas distributor in the combined teaching would be smaller than the distance between the temperature maximum to the surface of the fluidized bed.

Applicants argue that in Shirk, multitude of compartments are used and this would have the effect that a rise to an absolute temperature maximum would not happen in one single compartment because according to the disclosure of Shirk, the catalyst particles are allowed to passed through the trays dividing the compartments from each other so that the temperature rise is spread over several compartments.

This argument is not persuasive for the same reasons as stated above. Again, Shirk '946 fairly teaches that temperature control means is provided within each compartment and the temperature can be independently adjusted within each compartment (note column 1, lines 22-26). Since the reaction between hydrogen chloride and oxygen as disclosed in Hibi '640 is exothermic, it would take less time to increase the reaction temperature than to lower it.

The rejection over Hibi in view of Degnan and Shirk is maintained for the same reasons as stated above.

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ngoc-Yen Nguyen whose telephone number is (571)272-1356. The examiner can normally be reached on Part time schedule.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Emily Le can be reached on (571) 272-0903. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Ngoc-Yen M. Nguyen/
Primary Examiner, Art Unit 1734

nmn
September 26, 2011